



## Oceana proposal for a Marine Protected Area Kattegat trench

### INTRODUCTION

Kattegat is in the transition zone and the main gateway between the North Sea and the Baltic Sea through which the salty water of the former and the brackish water of the latter flow. The deep trench, located in the central part of Kattegat, spans 45 km from the northeast of Læsø towards the southeast, and boasts reefs and bubbling reefs. The deepest part of the trench is 151 meters down and the surrounding areas range from 20 to 40 meters deep<sup>1,2</sup>.

As salinity is remarkably higher in Kattegat than in the inner Baltic Sea, marine species are able to thrive and biodiversity is higher. In the deeper parts of Kattegat up to six times as many benthic species were found in a bottom sample compared to one from the inner Baltic Sea<sup>3</sup>.

Oceana conducted surveys in this area in 2011 and 2012.

## DESCRIPTION OF THE AREA

Kattegat trench and the surrounding slopes are mostly characterized by soft-bottoms, of mud or mixed mud-sand, but rocks and reefs also occur in some areas. The communities and species inhabiting the deep parts of the trench include the *Haploops* community, *Modiolus* beds, sponge aggregations, and sea pens with burrowing megafauna. The holes in the *Nephrops norvegicus* megafauna also create habitats for smaller animals thereby increasing the complexity of the seabed<sup>4</sup>.

A dramatic decline of the biodiversity of soft bottoms in open Danish waters was observed in Kattegat between the mid-1990s and the end of the 2000s. Despite this decline, which applies to individuals of both rare and dominating species, species composition remains the same. The reason for this is unknown. The same situation can be seen on stone reefs in Kattegat, but there is a degree of uncertainty<sup>5</sup>.

In 2011 and 2012, Oceana documented a number of rare benthic communities and species, including *Haploops* community, *Modiolus* community, and sponge aggregations.

Until recently, it was unclear whether the *Haploops* community, which takes its name from the small amphipod *Haploops* sp. (*Haploops tubicola* and *H. tenius*), existed in the area. However, in 2011 Oceana documented the rare species<sup>6</sup> on several occasions. The individual amphipod lives in small self-built tubes on mud bottoms in the deeper waters of Kattegat and the Sound. One particular community was detected using an underwater robot (ROV) in central Kattegat at 70 meters deep, where fish such as cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*) were also present.

*Modiolus* beds, which provide shelter to a number of benthic species, are found in Kattegat and the northern part of the Sound. The prevalence of horse mussels in Kattegat has changed remarkably in the last century. In the beginning of the 1900s, the species was widespread throughout the area, but today few remain<sup>7</sup>. In 2012, Oceana documented some areas where these beds can still be found, east of Læsø island in Danish waters, including a spot in central Kattegat, at 115 meters depth.

Sponge aggregations (*Suberites virgulosus*) were identified in the deeper part of the trench<sup>8</sup> at 80 meters depth, scattered on a muddy bottom. Krill (*Meganyctiphanes norvegica*), which were documented during most of the ROV immersions in deeper areas, were also present, along with cod.

Other recordings showed 87 species in shallower waters (23 to 45 meters depth), including sponges, hydroids, sea anemones (such as plumose anemone *Metridium senile*), jellyfish, comb jellies (including the invasive *Mnemiopsis leidyi*), worms, bivalves (such as *Pecten maximus*), sea snails (*Turritella communis*), sea slugs (*Onchidoris depressa*), chiton (*Tonicella rubra*), crabs, lobster (including *Nephrops norvegicus*), bryozoan (*Smittoidea reticulata*), brachiopod (*Crania anomala*), brittle stars (black brittle star *Ophiocomina nigra* and more species), star fish (including the common sunstar *Crossaster papposus* and the spiny starfish *Marthasterias glacialis*), six different tunicate species, and several species of fish, some which are listed as threatened and/or declining by HELCOM, including cod and dab (*Limanda limanda*). Four species of red algae and a brown algae species (*Laminaria latissima*) were also documented in the shallower water. Pieces of eelgrass were found at the bottom at one site (see entire species list in Table 3).

In the deeper waters of the trench, Oceana documented the *Pennatula phosphorea* sea pen community with burrowing megafauna (*Nephrops norvegicus*) at 140 meters depth. Among the fish documented there, were cod, ling (*Molva molva*), and common sole (*Solea solea*); species which HELCOM has classified as vulnerable, threatened and/or declining (Table 3).

## PROPOSAL

The Kattegat trench, despite the many threats it faces, is altogether considerably rich, both in species diversity and in number of individuals. Unfortunately, the rare benthic communities in the trench are currently unprotected and many other species and habitats, particularly in the deeper areas, are under-represented despite being crucial to the functioning of the ecosystem, as they provide food and shelter to many other species, including commercially important fish. Oceana also recorded trawling marks and badly damaged seabeds in some parts of the area, which underscores the need for trawling to be banned in these sensitive soft bottom communities.

Oceana proposes protecting an area of 5,035 km<sup>2</sup>, which includes both Danish and Swedish Natura 2000 sites<sup>9</sup>, and covers the deep trench in Kattegat, and the surrounding areas including some offshore banks (see the map above). The area includes a variety of depths, including four deep holes in the trench, which is mostly located in the Danish EEZ, but also extends into Sweden<sup>10,11</sup>.

The Natura 2000 sites included in the proposed area, primarily cover the shallower parts of Kattegat, and include habitats like sandbanks, reefs and bubbling reefs, which are protected under the Habitat Directive. The northwestern part of the proposed area in particular boasts biodiverse bubbling reefs. Though all documented bubbling reefs are currently protected under Natura 2000, it is likely that others will be found in Kattegat, which will need protection. Harbour porpoises, which are listed in Annex II and V of the directive, are also found in this part of Kattegat. The southeast part of the proposed site includes an area, which was determined via a bilateral agreement between Sweden and Denmark, that is seasonally closed to fisheries.

The southern part of the proposal includes an area which Oceana proposed for protection in 2011. The area includes shallower peaks rising at the southern end of Kattegat trench near the border of the Swedish EEZ. The area consists of mixed hard bottoms interspersed with sand and softer bottoms in deeper parts consisting of mixed mud, sand and gravel. Many fish, like sole (*Solea solea*), lumpfish (*Cyclopterus lumpus*), plaice (*Pleuronectes platessa*) and brill (*Scophthalmus rhombus*) as well as crabs have been recorded there<sup>12</sup>. This area is also an important spawning and nursery ground for herring and also other fish species<sup>13</sup>.

## POSSIBLE THREATS AND MANAGEMENT PROPOSALS

The status of Kattegat is generally poor, which the decline in biodiversity in Kattegat testifies to, and fish stocks are declining<sup>14</sup>. Bottom trawling is one of the main threats towards many benthic species and communities in the area, including sea pens and burrowing megafauna, *Modiolus* beds, sea urchins, *Haploops* sp., and *Arctica islandica*<sup>15,16,17</sup>.

Other threats include oxygen depletion, hazardous substances, ecosystem changes, invasive species, and eutrophication<sup>18,19,20</sup>.

A number of Danish environmental organizations have recently published a report, which also proposes the central part of Kattegat for protection<sup>21</sup>. A management plan for the area should address all the above mentioned human threats. The cod stock has decreased dramatically in Kattegat in the last decades, which have led both HELCOM and OSPAR to list the fish as threatened and/or declining. Species and communities that are vulnerable, threatened and/or in decline, should be particularly addressed in the management plan and declining fish stocks should be managed through international EU regulations.



The nudibranch *Tritonia hombergii* and dead men's fingers (*Alcyonium digitatum*). Kattegat, Denmark. © OCEANA/ Carlos Minguell

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## SPECIES LIST FOR KATTEGAT TRENCH

**Table 1:** List of species recorded in the Kattegat trench proposal area in 2011. Threat categories indicated in brackets.

Species
<b>PORIFERA</b>
<i>Demospongiae</i>
<i>Haliclona urceolus</i>
<i>Lophonopsis nigricans</i>
<i>Suberites virgultosus</i>
<b>HYDROZOA</b>
<i>Halecium halecinum</i>
<i>Nemertesia ramosa</i>
<i>Rhizocaulus verticillatus</i>
<i>Sertularella</i> sp.
<i>Sertularia cupressina</i>
<b>ANTHOZOA</b>
<i>Alcyonium digitatum</i>
<i>Pachycerianthus multiplicatus</i>
<i>Pennatula phosphorea</i>
<i>Urticina felina</i>
<b>SCYPHOZOA</b>
<i>Cyanea lamarckii</i>
<b>CTENOPHORA</b>
<i>Beroe cucumis</i>
<i>Pleurobrachia pileus</i>
<b>ANNELIDA</b>
<i>Arenicola marina</i>
<i>Filograna implexa</i>
<i>Sabella pavonina</i>
<b>MOLLUSCA</b>
<i>Buccinum undatum</i>
<i>Modiolus modiolus</i>
<i>Neptunea antiqua</i>
<i>Nucula</i> sp.
<i>Parvicardium exiguum</i>
<b>CRUSTACEA</b>
<i>Cancer pagurus</i>
<i>Haploops</i> sp.
<i>Hyas araneus</i>
<i>Lithodes maja</i>
<i>Meganyctiphanes norvegica</i>
<i>Munida rugosa</i>
<i>Pagurus bernhardus</i>
<i>Pandalus borealis</i>
<b>BRYOZOA</b>
<i>Crisia eburnea</i>
<i>Reteporella beaniana</i>

**Table 1:** List of species recorded in the Kattegat trench proposal area in 2011. Threat categories indicated in brackets.

Species
<b>BRACHIOPODA</b>
<i>Neocrania anomala</i>
<b>ECHINODERMATA</b>
<i>Acrocnida brachiata</i>
<i>Amphiura cf. chiajei</i>
<i>Brissopsis lyrifera</i>
<i>Echinus esculentus</i> (NT, IUCN)
<i>Ophiopholis aculeata</i>
<i>Ophiura albida</i>
<i>Ophiura ophiura</i>
<i>Spatangus purpureus</i>
<b>TUNICATA</b>
Asciacea
<b>FISH</b>
<i>Enchelyopus (Rhinonemus) cimbrius</i>
<i>Gadus morhua</i> (threatened and declining, HELCOM, OSPAR)
<i>Hippoglossoides platessoides</i> (probably declining, HELCOM)
<i>Limanda limanda</i> (probably declining, HELCOM)
<i>Lumpenus lampretaeformis</i> (CR, but not in Kattegat, HELCOM)
<i>Lycodes vahli</i>
<i>Micromesistius poutassou</i> (probably declining, HELCOM)
<i>Microstomus kitt</i> (probably declining, HELCOM)
<i>Merlangius merlangus</i> (probably declining, HELCOM)
<i>Molva molva</i> (vulnerable, HELCOM)
<i>Myxine glutinosa</i>
<i>Pleuronectes platessa</i> (probably declining, HELCOM)
<i>Reinhardtius hippoglossoides</i>
<i>Solea solea</i> (probably declining, HELCOM)
<b>ALGAE</b>
<i>Laminaria latissima</i>

**Table 2:** List of species recorded in the Groves Flak proposal area in 2011. Threat categories indicated in brackets.

Species
<b>PORIFERA</b>
<i>Clathria sp.</i>
<b>HYDROZOA</b>
<i>Rhizocaulus verticillatus</i>
<b>ANTHOZOA</b>
<i>Alcyonium digitatum</i>
<i>Pennatula phosphorea</i>
<i>Urticina felina</i>
<i>Virgularia mirabilis</i>
<b>CTENOPHORA</b>
<i>Beroe cucumis</i>

**Table 2:** List of species recorded in the Groves Flak proposal area in 2011. Threat categories indicated in brackets.

Species
<b>ANNELIDA</b>
<i>Amphitrite cirrata</i>
<i>Arenicola marina</i>
<i>Harmothoe sp.</i>
<i>Myxicola infundibulum</i>
<i>Pomatoceros triqueter</i>
<i>Spirorbis sp.</i>
<i>Terebellides stroemi</i>
<b>MOLLUSCA</b>
<i>Astarte montagui</i>
<i>Buccinum undatum</i>
<i>Modiolus modiolus</i>
<i>Nuculana pernula</i>
<i>Pecten maximus</i>
<i>Polinices pallidus</i>
<i>Pseudamussium peslutrae</i>
<i>Turritella communis</i>
<b>CRUSTACEA</b>
<i>Cancer pagurus</i>
<i>Haploops tubicola</i>
<i>Meganyctiphanes norvegica</i>
<i>Pagurus bernhardus</i>
<i>Pandalus borealis</i>
<b>ECHINODERMATA</b>
<i>Amphiura sp.</i>
<i>Asterias rubens</i>
<i>Astropecten irregularis</i>
<i>Brissopsis lyrifera</i>
<i>Henricia sanguinolenta</i>
<i>Marthasterias glacialis</i>
<i>Ophiocomina nigra</i>
<i>Ophiopholis aculeata</i>
<i>Ophiothrix fragilis</i>
<i>Ophiura albida</i>
<b>FISH</b>
<i>Callionymus lyra</i>
<i>Hippoglossoides platessoides</i> (probably declining, HELCOM)
<i>Limanda limanda</i> (probably declining, HELCOM)
<i>Lumpenus lampretaeformis</i> (CR, but not in Kattegat, HELCOM)
<i>Melanogrammus aeglefinus</i>
<i>Solea solea</i> (probably declining, HELCOM)
<i>Trachinus draco</i>
<b>ALGAE</b>
<i>Laminaria latissima</i>
<i>Phymatolithon lenormandii</i>

**Table 3:** List of species in the new and larger Kattegat trench proposal area in 2012, listed by depth and threat category.

Depth (m)	Species
135-140	<b>CNIDARIA</b>
	<i>Pennatula phosphorea</i>
	<b>CRUSTACEA</b>
	<i>Lithodes maja</i>
	<i>Meganyctiphanes norvegica</i>
	<i>Nephrops norvegicus</i>
	<i>Pagurus bernhardus</i>
	<i>Pandalus borealis</i>
	<b>ECHINODERMATA</b>
	<i>Brissopsis lyrifera</i>
	<i>Luidia sarsi</i>
	<i>Ophiura albida</i>
	<i>Ophiura</i> sp.
	<b>FISH</b>
	<i>Gadus morhua</i> (threatened and declining, HELCOM, OSPAR)
	<i>Lumpenus lampretaeformis</i> (CR, but not in Kattegat, HELCOM)
	<i>Melanogrammus aeglefinus</i>
	<i>Molva molva</i> (vulnerable, HELCOM)
	<i>Myxine glutinosa</i>
<i>Pleuronectidae</i> sp.	
<i>Solea solea</i> (probably declining, HELCOM)	
126-127	<b>CNIDARIA</b>
	<i>Aurelia aurita</i>
	<i>Cerianthus lloydii</i>
	<i>Mnemiopsis leidyi</i>
	<i>Pennatula phosphorea</i>
	<i>Virgularia mirabilis</i>
	<b>CRUSTACEA</b>
	<i>Liocarcinus depurator</i>
	<i>Meganyctiphanes norvegica</i>
	<i>Pagurus bernhardus</i>
	<i>Pandalus borealis</i>
	<b>ECHINODERMATA</b>
	<i>Amphiura chiajei</i>
	<i>Asterias rubens</i>
	<i>Brissopsis lyrifera</i>
	<i>Ophiura albida</i>
	<i>Spatangus purpureus</i>
	<b>FISH</b>
	<i>Limanda limanda</i> (probably declining, HELCOM)
<i>Myxine glutinosa</i>	
<i>Platichthys flesus</i>	
60-120	<b>PORIFERA</b>
	<i>Amphilectus</i> cf. <i>fucorum</i>
	<i>Haliclona urceolus</i>
	<i>Mycale lingua</i>
	<i>Suberites virgultosus</i>



**Table 3:** List of species in the new and larger Kattegat trench proposal area in 2012, listed by depth and threat category.

Depth (m)	Species
	<b>CNIDARIA</b>
	<i>Abietinaria abietina</i>
	<i>Alcyonium digitatum</i>
	<i>Aurelia aurita</i>
	<i>Eudendrium</i> sp.
	<i>Pennatula phosphorea</i>
	<i>Urticina felina</i>
	<b>ANNELIDA</b>
	<i>Arenicola marina</i>
	<i>Pectinaria belgica</i>
	<i>Sabella pavonina</i>
	<b>MOLLUSCA</b>
	<i>Buccinum undatum</i>
	<i>Heteronomia squamula</i>
	<i>Littorina</i> sp.
	<i>Modiolus modiolus</i>
	<i>Neptunea antiqua</i>
	<i>Nuculana pernula</i>
	<i>Polinices pulchellus</i>
	<i>Pseudamussium septemradiatum</i>
	<i>Turritella communis</i>
	<b>CRUSTACEA</b>
	<i>Haploops</i> sp.
	<i>Hyas araneus</i>
	<i>Liocarcinus depurator</i>
	<i>Lithodes maja</i>
	<i>Meganyctiphanes norvegica</i>
	<i>Munida rugosa</i>
	<i>Munida</i> sp.
	<i>Pagurus bernhardus</i>
	<i>Pagurus pubescens</i>
	<i>Pandalus borealis</i>
	<b>BRYOZOA</b>
	<i>Crisia</i> sp.
	<i>Reteporella beaniana</i>
	<b>ECHINODERMATA</b>
	<i>Asterias rubens</i>
	<i>Astropecten irregularis</i>
	<i>Brissopsis lyrifera</i>
	<i>Echinocardium flavescens</i>
	<i>Echinus esculentus</i> (NT, IUCN)
	<i>Leptasterias muelleri</i>
	<i>Luidia sarsi</i>
	<i>Marthasterias glacialis</i>
	<i>Ophiopholis aculeata</i>
	<i>Ophiura affinis</i>

**Table 3:** List of species in the new and larger Kattegat trench proposal area in 2012, listed by depth and threat category.

Depth (m)	Species
	<i>Ophiura albida</i>
	<i>Ophiura robusta</i>
	<i>Ophiura</i> sp.
	<i>Thyonidium</i> cf. sp.
	<b>FISH</b>
	<i>Amblyraja radiata</i> (threatened and declining, HELCOM)
	<i>Callionymus lyra</i>
	<i>Gadus morhua</i> (threatened and declining, HELCOM, OSPAR)
	<i>Hippoglossoides platessoides</i> (probably declining, HELCOM)
	<i>Limanda limanda</i> (probably declining, HELCOM)
	<i>Lumpenus lampretaeformis</i> (CR, but not in Kattegat, HELCOM)
	<i>Melanogrammus aeglefinus</i>
	<i>Merlangius merlangus</i> (probably declining, HELCOM)
	<i>Myxine glutinosa</i>
	<i>Platichthys flesus</i>
	<i>Pleuronectes platessa</i> (probably declining, HELCOM)
	<i>Pleuronectidae</i> sp.
	<i>Rhinonemus cimbricus</i>
	<i>Solea</i> cf. <i>solea</i> (probably declining, HELCOM)
	<i>Trachinus draco</i>
	<i>Trisopterus esmarkii</i>
23-45	<b>PORIFERA</b>
	<i>Halichondria panicea</i>
	<i>Haliclona urceolus</i>
	<i>Hymedesmia</i> cf. sp.
	<i>Suberites ficus</i>
	<b>CNIDARIA</b>
	<i>Abietinaria abietina</i>
	<i>Alcyonium digitatum</i>
	<i>Beroe cucumis</i>
	<i>Bolinopsis infundibulum</i>
	<i>Caryophyllia smithii</i>
	<i>Cyanea capillata</i>
	<i>Dynamena pumila</i>
	<i>Eudendrium</i> sp.
	<i>Halecium halecinum</i>
	<i>Halitemma</i> sp.
	<i>Hydractinia echinata</i>
	<i>Hydractinia</i> sp.
	<i>Kirchenpaueria pinnata</i>
	<i>Lafoea dumosa</i>
	<i>Metridium senile</i>
	<i>Mnemiopsis leidyi</i>
	<i>Pachycerianthus multiplicatus</i>
	<i>Pennatula phosphorea</i>
	<i>Sertularia</i> cf. <i>cupressina</i>

**Table 3:** List of species in the new and larger Kattegat trench proposal area in 2012, listed by depth and threat category.

Depth (m)	Species
	<i>Sertularella cf. rugosa</i>
	<i>Tubularia indivisa</i>
	<i>Virgularia mirabilis</i>
	<b>ANNELIDA</b>
	<i>Arenicola marina</i>
	<i>Pectinariidae</i> sp.
	<i>Pomatoceros triqueter</i>
	<i>Sabella pavonina</i>
	<b>MOLLUSCA</b>
	<i>Acanthocardia cf. echinata</i>
	<i>Aporrhais pespelecani</i>
	<i>Arctica islandica</i>
	<i>Bittium reticulatum</i>
	<i>Buccinum undatum</i>
	<i>Ensis</i> sp.
	<i>Epitonium clathrus</i>
	<i>Gibbula</i> sp.
	<i>Iothia fulva</i>
	<i>Onchidoris depressa</i>
	<i>Pecten maximus</i>
	<i>Tonicella rubra</i>
	<i>Tritonia hombergii</i>
	<i>Turritella communis</i>
	<b>CRUSTACEA</b>
	<i>Cancer pagurus</i>
	<i>Inachus dorsettensis</i>
	<i>Nephrops norvegicus</i>
	<i>Pagurus bernhardus</i>
	<i>Scalpellum scalpellum</i>
	<b>BRYOZOA</b>
	<i>Smittoidea reticulata</i>
	<b>BRACHIOPODA</b>
	<i>Crania anomala</i>
	<b>ECHINODERMATA</b>
	<i>Asterias rubens</i>
	<i>Astropecten irregularis</i>
	<i>Crossaster papposus</i>
	<i>Echinocardium cordatum</i>
	<i>Henricia sanguinolenta</i>
	<i>Marthasterias glacialis</i>
	<i>Ophiocomina nigra</i>
	<i>Ophiopholis aculeata</i>
	<i>Ophiothrix fragilis</i>
	<i>Ophiura albida</i>
	<i>Spatangus purpureus</i>
	<i>Strongylocentrotus</i> cf. sp.

**Table 3:** List of species in the new and larger Kattegat trench proposal area in 2012, listed by depth and threat category.

Depth (m)	Species
	<b>TUNICATA</b>
	<i>Ascidia conchilega</i>
	<i>Ascidia mentula</i>
	<i>Ascidia virginea</i>
	<i>Ascidiella scabra</i>
	<i>Ciona intestinalis</i>
	<i>Molgula occulta</i>
	<b>FISH</b>
	<i>Anguilla</i> cf. <i>anguilla</i> (CR, IUCN)
	<i>Aphia minuta</i>
	<i>Callionymus lyra</i>
	<i>Ctenolabrus rupestris</i>
	<i>Gadus morhua</i> (threatened and declining, HELCOM, OSPAR)
	<i>Hippoglossoides platessoides</i> (probably declining, HELCOM)
	<i>Labridae</i> sp.
	<i>Lumpenus lampretaeformis</i> (CR, but not in Kattegat, HELCOM)
	<i>Limanda limanda</i> (probably declining, HELCOM)
	<i>Myoxocephalus scorpius</i>
	<i>Pleuronectidae</i> sp.
	<i>Pomatoschistus</i> cf. <i>minutus</i>
	<i>Trachinus draco</i>
	<b>RHODOPHYCEAE</b>
	<i>Apoglossum</i> cf. <i>ruscifolium</i>
	<i>Delesseria sanguinea</i>
	<i>Hildenbrandia rubra</i>
	<i>Lithothamnion glaciale</i>
	<b>PHAEOPHYCEAE</b>
	<i>Laminaria latissima</i>
	<b>ANGIOSPERMAE</b>
	<i>Zostera</i> sp. (piece was found)

**Table 4:** List of habitats and communities in Kattegat trench 2011 and 2012, and their threat category.

Habitats and communities	Red list category
<i>Amphiura</i>	
Coral garden	Threatened and/or declining (OSPAR)
Echinoderm	
<i>Haploops</i>	No official assessment, but HELCOM proposed EN
<i>Modiolus</i> bed	Threatened and/or declining (OSPAR)
Tube worm	
Sea pen with burrowing megafauna	Threatened and/or declining (OSPAR and HELCOM)
Baltic sponge aggregation	Deep sea sponge aggregations are listed as threatened and/or declining by OSPAR
Pelagic, offshore (deep) waters	Threatened (HELCOM)